1998, filed February 5, 1996 (Heiskari) have been cited as prior art of record but not relied upon and considered pertinent.

The specification has been amended to correct informalities without the addition of new matter. Claims 1and 7 have been amended to clarify the invention for a better understanding Before responding to the rejections, Applicant would like to distinguish Briere and Buch from the present invention (Benveniste), as follows.

1. Briere discloses a method for automated and autonomous planning of a revision to a frequency plan within a cellular communications systems. Communication quality measurements, e.g. cell interference and bit error rate are made on the uplink and down link and evaluated to identify potential candidates for reallocation of frequencies. An open loop processing method (col. 6, lines 25-61) is used to effectuate a revision in a frequency plan. An operator evaluates network performance and selects proposals for returning and controlling frequency planning (col. 8, line 25-44). Based on the measurements, calculations are made to minimize the effects of adjacent channel interference, (col. 18, lines 14-36). And a revision is made to the frequency plan assignment. Briere fails to disclose elements of Benvenieste, as follows:

A. Briere discloses revising a frequency plan for a cellular network by identifying candidate frequencies that could be assigned as a result of a revision in the frequency plan where one or more selected frequencies or frequency groups for interfered cells are assigned a place in corresponding one or more uninterfered or less interferred frequencies. *In contrast, Benvenvieste identifies channels that are available in the spectrum shared by the primary and adjunct systems for channels that are noisy or unavailable to the cell in the adjunct system.*

B Briere discloses a method for minimizing adverse affects of adjacent channel

interferences in a cellular communications system operating as a single cellular system. *In contrast, Benvenvieste discloses two systems, a primary system and an adjunct system that is naturally shielded from interference from the primary system, the adjunct system identifying channels for use in a RF spectrum shared with the primary system.*

C. Briere discloses quality related measurements, that is interference and bit error rates on uplink and downlink for cells with the purpose of identifying potential candidates for reallocation in a frequency assignment plan. *In contrast, Benvenieste discloses adjunct base stations monitoring all RF channels in a shared RF spectrum and partitioning them into two sets, a set of channels likely to be interference free and a set of noisy channels.*

2. Buch discloses a disc drive data storage device having a high-performance data acquisition control loop for improving signal acquisition performance in a disc drive read channel. The multi mode timing loop combines an analog based timing loop and a digital timing loop for timing data samples. The data samples are provided to a timing error extractor, which generates sampling phase estimates for approximately phase locking the loop until the adaptive components in the loop can settle. Buch fails to disclose elements of Benvenieste, as follows:

A. Buch discloses a high-performance data acquisition control loop for improved signal acquisition performance in a disc drive read channel. *In contrast, Benvenieste discloses a primary and an adjunct cellular communications system sharing the same radio frequency spectrum where the adjunct system is shielded from the primary system.*

B. Buch discloses sampling a timing error extractor for estimating the phase angle between two signals for phase locking a control loop in a disk drive data storage decice. *In contrast, Benvenieste discloses performing signal measurements for determining the availability of a channel by an adjunct cellular system in a shared RF spectrum with a primary system.*

Applicants submit that neither Briere nor Buch show or suggest two different cellular systems isolated from one another, the systems sharing a RF spectrum and based upon measurements using a sampling technique made by the adjunct system determining the availability or unavailability of channels in the primary system for use by the adjunct system Briere describes revising the frequency assignment plan based on measurements taken on uplink and downlink paths between a base station and a cell. Buch describes a sampling technique for adjusting the phase between two signals for improved signal acquisition in a disc drive read storage device. Buch does not expand the Briere disclosure to suggest a layered communication based on sampling technique described in Buch. Without a disclosure in Briere or Buch, alone or in combination, of a layered primary and adjunct systems using sampling measurements for determining the availability or unavailability of channels for use by the adjunct system in a shared RF spectrum, there is no basis for a worker skilled in the art to implement the layered communication system of Benvenieste. Moreover, there is no motivation for a worker skilled in the art to use the sampling technique of Buch and Briere because the measurements in Briere are not made on a sample basis. According, there is no support for the rejection of Claims 1-14 based on Briere or Buch alone or in combination and the rejection under 35 USC 102(e) or 103(a) should be withdrawn.

Now turning to the rejections, Applicant provides responses to the indicated paragraphs of the Office Action, as follow:

REGARDING PARAGRAPH 2 & 3:

Claims 1-2, 4, 7-8, 10, 13-14 include elements not shown or suggested in Briere, as follows:

(i) Claims 1, 7, 13:

"... monitoring RF channels by the adjunct system and partitioning them into two sets, a set of channels likely to be interference-free and a set of noisy channels;"

Contrary to the Examiner's statement, col. 43, lines 47-67 do not describe the primary and adjunct wireless system for all RF channels are monitored by an adjunct system. The cited reference describes a method for automated and autonomous planning of a revision to a frequency plan assignment within a cellular communications system. Specifically, communications quality within a cellular communications system is evaluated and a revision to a frequency plan assignment identifies marked frequencies in preventing a cell from being reallocated to use the mark frequency. In contrast, Benveniste describes a primary system and an adjunct system isolated from one another where the adjunct system monitors all shared RF channels and divides them into a set of channels likely to be interference-free and a set of noisy channels, which may be attributed to background noise or to selective use of the channels by the base stations and mobiles of the primary system in the vicinity of the monitoring adjunct

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system. Applicant submits, the cited reference describes a single cellular communications system and not a layered communications system of two systems isolated from one another and sharing the same RF spectrum.

(ii) "...forming a pool of interference-free channels for use by all adjunct base stations;"

Contrary to the Examiner's statement, the cited reference does not disclose forming a pool of interference-free channels, but, identifies a marked channel, which is not available to be reallocated to other cells. In contrast, Benvenieste discloses both noisy and interference-free reserved for backup purposes when a high bit error rate is observed on an adjunct channel.

(iii) "...assigning channels to adjunct cells from the interference-free set;"

The cited reference discloses re-assigning frequencies in a single system and withholding assignment when a frequency is marked. In contrast, Benvenieste discloses assigning channels to adjunct cells when the channel may not be in use in the primary system. Benvenieste does not prevent channels from being assigned, except when they are not in the interference-free set of channels.

(iv)..."grouping interference-free channels left unassigned

as backup channels in case the unassigned channels become noisy."

The cited reference evaluates sub-frequency groups in identifying candidates within the subgroup for a new cell being added to the cellular communications system. In contrast, Benvenieste groups interference-free channels and selects any channel in the group, not the best candidate as in the case of the cited reference.

Summarizing, Claims 1, 7 and 13 describe two separate communications system, shielded from one another and sharing the same RF spectrum One system monitors the shared RF spectrum _ to form pools of interference-free channels as backup channels in when an assigned channel in the one system becomes noisy. In contrast, Briere describes a single cellular communications systems monitoring channels for interference and re-placing channels when interference condition exist on the channel.

Without a disclosure in Briere of a layered communication system, there is no basis for a rejection of Claims 1, 7 and 13 under 35 USC 102 (a) and the rejection should be withdrawn.

B. <u>Claims 2-8</u>:

(i) "...monitoring active assigned channels through measurements... (a channel)... classified as noisy... is replaced by

a backup channel and if a channel has a weak signal and a high bit error rate than a handoff is made to an adjacent adjunct cell;"

Contrary to the Examiner's statement Col 18, lines 14-36 does not describe Claims 2 - 8. The cited reference describes a network validating check to determine if two cells are close to each other. If the calculated distance is less than the threshold, the cells are too close to each other and a warning is issued that the frequency change may have adverse consequences to the network if implemented. In contrast, Benvenvieste compares signal strength and bit error rate for substituting a backup channel or providing a hand off to an adjacent adjunct cell. Clearly, Benvenieste in changes channels based on different parameters than Briere in changing frequency assignment.

(ii) "...monitoring all assigned channels by replacing each with a backup channel which is monitored as a non-assigned channel;"

Briere discloses replacing a selected frequency by identifying candidates from a selected frequency group where the best available candidate has better quality relating to interference and is chosen to replace the selected frequency. In contrast, Benvenieste discloses the adjunct system monitoring channels that are active in the adjunct system and, if necessary, replacing an

active channel with a backup channel from an interference-free set of channels for use by all adjunct stations. Clearly, Briere does not establish backup channels where one group of cells is shielded from other cells in the network.

Summarizing, Briere does not disclose adjunct system replacing active channels when noisy with a backup channel when the channel is not being used by the adjunct network provided the backup channel is not noisy or there is a likelihood of future interference by activity in nearby cells in the primary network.

Without a disclosure in Briere of elements (i) and (ii), there is no basis for the rejection of Claims 2 - 8 under 35 USC 102 (a) and the rejection should be withdrawn.

C. Claims 4, 10:

(i) "... monitoring the channels and updating their classification if there is a change in the background noise or in spectrum used by primary system."

The cited reference discloses open loop processing for the cellular system. In contrast, Claims 4, 10 describe monitoring channels in the adjunct system shielded from the primary system.

Without a disclosure in Briere of element (i), there is no basis for the rejection of Claims 4, 10 under 35 USC 102 (a) and the

rejection should be withdrawn

D. Claim 14:

(i) "... said processor at the adjunct base station coordinates signal strength measurements, which are made by mobile stations . . for spectrum monitoring purposes in connection with measurements made by said RF monitor located at the adjunct base station".

The cited reference discloses a single communication system assigning frequencies according to signal measurements. The reference fails to disclose an adjunct system monitoring frequencies shared with a primary system for purposes of channel reliability in the adjunct system.

Without a disclosure in Briere of element (i), there is no basis for the rejection of Claim 14 under 35 USC 102 (a) and the rejection should be withdrawn.

REGARDING PARAGRAPHS 4/5:

A. Claims 3, 9:

(i) "... during an initialization phase, performing a series of consecutive uplink and downlink measurements of a channel having a sample size N over a testing interval, the magnitude of the sample size and testing interval being based on an error probability analysis "

Briere fails to show sampling in assigning frequencies to transceivers in a cellular telephone system. The sampling method of Buch relates to determining the phase angle between two signals in a control loop for a disk drive read storage device. The Buch sampling technique does not compute for assigning frequencies in Briere based on cell interference and bit error rates.

Without a disclosure or need for sampling in Briere, A worker skilled in the art wold not be motivated to use the Buch sampling technique in Briere. Accordingly, the rejection of Claims 3, 9 under 35 USC 103 (a) based upon Briere in view of Buch is without support and should be withdrawn.

B. Claims 5, 11:

Claims 5 and 11 depend upon Claims 1 and 7 respectively, and are patentable on the same basis thereof. Moreover, Buch describes storing trigonometric values for determining a phase angle between a clock signal and a data signal for controlling the sampling frequency and sampling phase relative to a data signal, a data frequency and a data phase. Briere describes measuring channel bit error rates and interference measurements for selecting the best frequency candidate for a selected frequency. Applicants submit there is no link between Briere and Buch to incorporate the trigonometric sampling in Buch as a basis for sampling the channel bit error rates and interference measurements in Briere.

Applicant submits that Briere, in view of Buch do not describe the elements in Benvenvieste nor would a worker skilled in the art be motivated to incorporate the sampling of Buch in the measurement system of Briere due to the different parameters being measured by the disclosure. The rejection of Claims 5, 11 under 35 USC 103 (a) based upon Briere in view of Buch is without support and should be withdrawn. A worker skilled in the art has no teaching in Briere to apply the sampling technique of Buch since there is no need for sampling in Briere and if such was the case, the sampling parameters of Buch are not applicable to Briere.

C. Claims 6, 12:

(1) ".. performing sequential tests of the channel at random time spacing between consecutive measurements, wherein an analysis of the noise or interference signal strength is made after each individual measurement;

Briere and Buch fail to describe the sampling measurements in claims 6 and 12 on the same basis that claims 5 and 11 fail to disclose the sampling measurements of Benvenvieste.

Accordingly, The rejection of Claims 6, 12 under 35 USC 103 (a) based upon Briere in view of Buch is without support and

should be withdrawn. A worker skilled in the art has no teaching in Briere to apply the sampling technique of Buch since there is no need for sampling in Briere and if such was the case, the sampling parameters of Buch are not applicable to Briere.

Summarizing, Claims 1-14, describe a layered cellular system where an adjunct cellular system is shielded from a primary cellular system, both cellular systems sharing the same RF frequency. Neither Briere nor Buch describe a layered cellular system. Briere describes a single cellular system, while Buch describes a sampling technique for a disc drive.

Accordingly, Claims 1-14 describe elements not shown or suggested in Briere in view of Buch for the reasons outlined above. A worker skilled in the art has no teaching to implement Claims 1-14 and without such teaching, there is no basis for the rejection of Claims 1-14 under 35 USC 102(e) or 103(a). Moreover, there is no basis for combining the teachings of Briere with Buch because (a) there is no need for sampling in Briere, and (b) if such was the case the measurements taken in Buch would not be applicable to the measurements of Biere.

Withdrawal of the rejection and allowance of Claims 1-14 is requested on the basis outlined above.

REGARDING PARAGRAPH 6:

Sakamoto describes a mobile communication system and a base station which can prevent base stations of a plurality of networks from being equipped to overlap each other Sakamoto does not describe a layered communication system where an adjunct network is shielded from a primary network yet shares the RF spectrum of the primary network.

Heiskari discloses a mobile communication system functioning in the event of an uplink channel break due to disturbances or technical fault. Heiskari fails to disclose a layered communications system, which allows an adjunct system to share an RF spectrum with a primary system and use the unused primary channels.

Neither Sakamoto or Heiskari disclose or suggest the present invention and are believed to be only cumulative to the prior art already cited.

CONCLUSION:

Having amended the specification and claims to clarify the invention; distinguished the claims from the cited art, Applicant requests entry of the amendment, allowance of the claims and passage to issue of the case.

Pursuant to 37 C.F.R. § 1.121, Attachment A, showing a mark-up version of the changes made to the specification and claims by the current Amendment is attached hereto.

AUTHORIZATION:

The Commissioner is hereby authorized to charge any additional fees which may be required for the timely consideration of this amendment under 37 C.F.R. §§ 1.16 and 1.17, or credit any overpayment to Deposit Account No. 13-4503, Order No.. 2455-4628

Respectfully submitted,
MORGAN & FINNEGAN, L.L.P

Dated. DRAFT By: ______________________

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PATENT
Docket No. 2455-4628

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Mathilde Benveniste

Serial No. 09/401,408 Group Art Unit: 2682

Filed: September 22, 1999 Examiner: N. Mehrpour

For: SELF-CONFIGURABLE WIRELESS SYSTEMS: SPECTRUM MONITORING IN A LAYERED CONFIGURATION

ATTACHMENT A – SHOWING MARKUP OF CHANGES

COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

IN THE SPECIFICATION:

Page 1, first paragraph, (lines 12-18) and fifth paragraph (lines 38-45), respectively, has been AMENDED as follows:

BACKGROUND OF THE INVENTION

1. Field of Invention

The invention disclosed broadly relates to wireless communications and more particularly relates to coordinating RF use in multiple, collocated wireless systems sharing **[the same]** RF spectrum.

Demand for wireless voice and data communications continues growing in all aspects of life and will soon lead to a diverse and complex mixture of cells, found in the most unpredictable RF propagation environments. Such cells may exist in layered configurations that enable greater

re-use of the RF spectrum and provide continuity of communication between the cell layers. RF planning for such systems is difficult to do manually. In addition to the planning complexity, the cost of manual RF planning becomes a more substantial portion of wireless communication costs as the cost for base stations of the Wireless Centrex Service[.] decreases. Ideally, one would want wireless systems that can self configure, and layered configurations that involve no elaborate planning and coordination of RF use between cell layers.

Page 5, second paragraph (lines 10-41), has been AMENDED as follows:

Channels are assigned to adjunct cells from the interference-free set. The interference-free channels left unassigned serve as back-up channels in case the assigned channels turn noisy Channel use within the adjunct system leads to different spectrum monitoring procedures during different system phases. During system initialization -- a brief self-calibration phase that requires no human participation -- there are no calls served and, consequently, the users of a channel lie entirely outside the system. During system operation, when the adjunct base stations and mobile units are transmitting, signals on a channels may be generated both inside and outside the adjunct system. In this phase, the spectrum-monitoring procedure employed depends on whether the monitored channel is used by the adjunct system We refer to a channel used by the adjunct system as an *assigned* channel. The *non-assigned* channels include both noisy channels and interference-free channels that have been reserved for back-up purposes. Monitoring non-assigned channels maintains a pool of interference-free back-up channels. Monitoring assigned channels is necessary as interference on control channels causes loss of registered mobiles and prevents new mobile registrations, while interference on traffic channels degrades the quality of

communication. Active assigned channels (channels bearing calls) are monitored through measurement of the serving signal strength and the bit-error rate. If a channel that enjoys a strong serving-signal experiences high bit-error rate, it is deemed noisy and is replaced by a back-up channel. If, on the other hand, a high bit-error rate is observed on a channel with a weak serving signal, a hand-off is requested. Inactive assigned channels (channels bearing no calls) are replaced periodically by back-up channels, which are monitored as non-assigned channels. We will not deal with spectrum monitoring of assigned channels further in this **[paper]** **specification**. Our subsequent discussion pertains only to monitoring non-assigned channels during system operation and all channels during system initialization. In **this [paper]** **specification**, interference from sources outside the adjunct system is attributed either to background noise, or to the selective use of channels by the base stations and mobiles of the primary system in the vicinity of the monitoring adjunct system. For simplicity, we will assume that the background noise exhibits no random variation. Thus, when the background noise is strong, a single measurement suffices to establish the status of a channel. When, on the other hand, the background noise is low, one must deduce the likelihood of experiencing interference in the future from the channel's past utilization in nearby cells of the primary system. The problem thus becomes to determine from signal strength measurements, serving as proxies for channel-use data, the likelihood that a channel will carry primary system traffic in the vicinity of the adjunct system.

Page 7, third paragraph (lines 20-27), has been AMENDED as follows:

The objective during system initialization is to complete the classification of all channels in the shortest possible time so that operation may start. Since the base stations serve no calls, they are available to engage in spectrum monitoring measurements when and as needed. Measurements can thus be made at pre-specified time intervals, which are set to give a statistical sample that conforms to the test-design objective and, at the same time, maintains an error probability below a specified level. **[Section 3]**<u>**The following section on initialization phase and Test design**</u> describes the design of the test employed during system initialization. Figure 2A shows the steps in the initialization state which includes the connection, initial calibration, and system optimization stages.

Page 8, second paragraph (lines8-17) and fifth paragraph (lines 40-43), respectively, has been AMENDED as follows:

The objectives of spectrum monitoring in the two phases are different. The objective during system operation is to make as few measurements as possible because of the undesirable impact of long times off a radio's assigned channel, which would make it imprudent to engage a base station radio in spectrum monitoring excessively. Another difference relates to the random nature of the waiting times between consecutive measurements. Unlike measurements during system initialization, measurements during system operation cannot be made when and as needed; they must be made only when there are base stations and mobiles available to do so. **[Section 4]** <u>**the following section on operation and testing design**</u> describes the test employed during system operation. Figure 2B shows the steps of the learning phase which continues from

the system optimization stage and begins the operation stage.

Error probability analysis

The probability, p_E, associated with the false acceptance of the test hypothesis is the sum of the probabilities of two disjoint events: the probability p_0 that no calls will occur during the test, and the probability **[p_0]** **<u>pr</u>** that all the calls that occur during the test will fall between consecutive measurements. That is,

$$p_E = p_0 + p_r \qquad (1)$$

Page 11 (lines 30-45), has been AMENDED as follows:

The test-design objective during system operation, namely, the minimization of the required number of measurements, is achieved in two different ways: First, by employing sequential analysis and, second, by selecting the target spacing between consecutive measurements on the same channel accordingly. The remainder of the **[paper]** **<u>specification</u>** deals with the sequential testing methods that may be employed during system operation. We present only tests involving simple arithmetic operations, in order to illustrate the versatility and ease of implementation of the proposed method for different equipment configurations.

IN THE CLAIMS:

Claims 1 and 7 have been AMENDED as follows:

1. (Amended) A method for coordinating RF use in primary and adjunct wireless systems which are layered in a common geographic area**, the adjunct system shielded from interference from the primary system** , and which share the same the same RF spectrum, wherein the adjunct system includes adjunct base stations defining respective adjunct wireless cells and serving adjunct mobile stations located within the respective adjunct cell and the primary system includes primary base stations defining respective primary wireless cells and serving primary mobile stations located within the primary wireless cell, comprising:

monitoring all RF channels **by the adjunct system** and partitioning them into two sets, a set of channels likely to be interference-free and a set of noisy channels;

forming a pool of interference-free channels for use by all adjunct base stations;

assigning channels to adjunct cells from the interference-free set; and

grouping interference-free channels left unassigned as back-up channels in case the assigned channels become noisy.

7. (Amended) A system for coordinating RF use in primary and adjunct wireless systems which are layered in a common geographic area, **the adjunct system shielded from interference from the primary system**, and which share the same the same RF spectrum, wherein the adjunct system includes adjunct base stations defining respective adjunct wireless cells and serving adjunct mobile stations located within the respective adjunct cell and the primary system includes primary base stations defining respective primary wireless cells and serving primary mobile stations located within the primary wireless cell, comprising:

an RF monitor in an adjunct base station monitoring all RF channels and partitioning them into two sets, a set of channels likely to be interference-free and a set of noisy channels;

a processor in the adjunct station forming a pool of interference-free channels for use by all adjunct base stations;

said processor assigning channels to adjunct cells from the interference-free set; and said processor grouping interference-free channels left unassigned as back-up channels in case the assigned channels become noisy.